

77. The wristwatch band as claimed in claim 25, produced by connecting the band pieces to each other by means of connecting parts, carburizing the band pieces and the connecting parts, and thereafter polishing surfaces of the band pieces.

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Cont

78. The wristwatch band as claimed in claim 25, wherein the band pieces are connected to each other by means of connecting parts of stainless steel, each of the connecting parts having on at least a portion of its surface a carburized layer wherein carbon is diffused so as to form a solid solution. --

REMARKS

Claims 1-57 are pending in the present application; claims 2, 3, 5, 17, 20, 23, 58, and 59 are cancelled; and claims 70-78 have been added to the application by way of this amendment. Claims 1 and 16 have been amended to limit the solute atom to carbon and the basis material to stainless steel, to indicate that no crystalline chromium carbide is formed, and that the hard coating has a surface hardness greater than that of the carburized layer. Support for this amendment can be found in original claims 2, 3, and 5; page 49, lines 3-5; and Example A1 in the specification. Claims 8-12 have been amended to indicate that the hardened layer is a carburized hardened layer. These amendments are supported, for example, at page 16, lines 13-19 of the specification. The amendments to claims 19, 21, 24, and 25 are supported at page 49, lines 3-5. Claim 26 has been amended to correct obvious typographical errors. Claim 70 is supported at page 27, lines 4-5. Claim 71 is supported at page 28, lines 12-13. Claim 72 is supported in the examples. Claim 73 is supported at page 44, lines 2-4 and page 73, lines 6-7 (Example A1). Claim 74 is supported at page 17, lines 6-9. Claims 75 and 76 are supported at page 42, lines 19-22. Claim 77 is supported by claim 27. Claim 78 is supported by claim 26.

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The Examiner has not considered claims 58-69 as set forth in the Preliminary Amendment, filed May 7, 2001. Claims 58 and 59 have been cancelled, Claims 60-69 are allowable as indicated relative to the claims from which they depend as indicated below.

The purpose of the present invention is to provide a decorative item that includes a stainless steel basis material having a high surface hardness, i.e., greater scratch resistance, than that of conventional decorative items, while maintaining corrosion resistance inherent in stainless steel.

The purpose described above was achieved by adopting a carburized hardened layer extending from a surface of the basis material to an arbitrary depth wherein carbon is diffused so as to form a solid solution in which crystalline chromium carbide is not formed; and further, at least one hard coating is disposed on a surface of the carburized hardened layer of the basis material. The hard coating has a surface hardness greater than that of the carburized layer.

Further, it was found that such a decorative item can be achieved by adopting the specific process as claimed.

Claims 1-57 stand rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 5,792,282 or JP 09071854 to Daido Hoxan (hereinafter "Hoxan").

Hoxan discloses a method of carburizing austenitic stainless steel that includes the steps of holding austenitic stainless steel in a fluorine- or fluoride-containing gas atmosphere with heating prior to carburizing and carburizing the austenitic stainless steel at a temperature not more than 680°C. The austenitic stainless steel includes 1 to 6 weight % molybdenum or 13 to 25 weight % chromium. The resulting product has a structure of (i) an austenitic stainless steel basis material and (ii) a carburized layer.

However, Hoxan fails to disclose a decorative item having the presently claimed structure of (i) an austenitic stainless steel basis material, (ii) a carburized layer, and (iii) a hard coating.

In the present invention, the decorative item has excellent scratch resistance due to the enhanced surface hardness that results from providing a hard coating that has a surface hardness greater than that of the carburized layer. Hoxan fails to disclose all of the limitations or elements of the presently amended claims and, therefore, does not anticipate the claims. Accordingly, the rejection of claims 1-57 under 35 U.S.C. § 102(b) should be withdrawn.

Claims 1-8, 10-13, 15-40, 43 and 44 stand rejected under 35 U.S.C. § 102(b) as being anticipated by JP 51059732 or JP 51059733 to Suwa Seikosha (hereinafter "Seikosha"). A partial translation of the Seikosha references are attached hereto.

Seikosha JP'732 discloses an external timepiece part having double carbide layers that include a carbide layer formed on the part by a carburizing treatment and a metallic carbide layer of excellent corrosion resistance formed on the carbide layer.

However, Seikosha JP'732 does not disclose, teach, or suggest the presently claimed decorative item and the effectiveness thereof. For example, JP'732 does not disclose or suggest a carburized hardened layer in which crystalline chromium carbide is not formed, or a hard coating disposed over the carburized hardened layer, where the hard coating has a surface hardness greater than that of the carburized layer, as is presently claimed.

Seikosha JP'733 discloses an external timepiece part having double nitride layers that include a nitride layer formed on the part by a nitriding treatment and a metallic carbide layer having excellent corrosion resistance formed on the carbide layer. Thus, because JP'733 requires a nitride layer, and not a carburized layer, it is completely different from the presently claimed decorative item.

As neither of the Seikosha references discloses all of the limitations or elements of the presently amended claims, they do not anticipate the claims. Accordingly, the rejection of claims 1-8, 10-13, 15-40, 43, and 44 under 35 U.S.C. § 102(b) should be withdrawn.

Claims 1-8, 10-13, 19-28, 38-40, 43, and 44 stand rejected under 35 U.S.C. § 102(b) as being anticipated by JP 57072605 to Tonan (hereinafter "Tonan"). A partial translation of Tonan is attached hereto.

Tonan discloses a process for producing a hard watchstrap that includes constructing a watchstrap with titanium or a titanium alloy, subjecting the watchstrap to gas nitriding or carburizing to form a first hard layer on the watchstrap surface and simultaneously forming a hard layer between the first hard layer and the substrate by means of diffusion, and forming a second hard layer by a physical deposition process, such as ion plating, on the first hard layer.

Thus, the hard watchstrap disclosed by Tonan is completely different in its structure from the presently claimed decorative item. For example, Tonan does not disclose or suggest a carburized hardened layer in which crystalline chromium carbide is not formed, or a hard coating disposed over the carburized hardened layer, where the hard coating has a surface hardness greater than that of the carburized layer, as is presently claimed.

As Tonan does not disclose all of the limitations or elements of the presently amended claims, it does not anticipate the claims. Accordingly, the rejection of claims 1-8, 10-13, 19-28, 38-40, 43, and 44 under 35 U.S.C. § 102(b) should be withdrawn.

Claims 1-12, 19-28, and 38-44 stand rejected under 35 U.S.C. § 102(b) as being anticipated by JP 58199858 to Seiko Densi (hereinafter "Densi"). An English language abstract of Densi is attached hereto.

Densi discloses external parts for a wristwatch prepared by nitriding the surface of stainless steel, followed by forming a TiN layer by a reactive ion plating method.

Thus, the parts disclosed by Densi are completely different in their structure from the presently claimed decorative item. For example, Densi does not disclose or suggest a carburized hardened layer in which crystalline chromium carbide is not formed, or a hard coating disposed over the carburized hardened layer, where the hard coating has a surface hardness greater than that of the carburized layer, as is presently claimed.

As Densi does not disclose all of the limitations or elements of the presently amended claims, it does not anticipate the claims. Accordingly, the rejection of claims 1-12, 19-28, and 38-44 under 35 U.S.C. § 102(b) should be withdrawn.

Claims 1-12, 19-28, and 38-44 stand rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 5,292,555 to Preisser (hereinafter "Preisser"); U.S. Patent No. 3,772,096 to Maquelin (hereinafter "Maquelin"); JP 57098671 or JP 52082642 to Suwa (hereinafter "Suwa"); or JP 56008004 to Glory (hereinafter "Glory"). A partial translation of Suwa JP'642 and Glory and an English language abstract of Suwa JP'671 are attached hereto.

Preisser discloses a process for applying nitride layers to titanium and titanium alloys. Layer thicknesses of 20 μm are obtained by pressure-nitriding in an ammonia atmosphere. Thus, the parts disclosed by Preisser are completely different in their structure from the presently claimed decorative item. For example, Preisser does not disclose or suggest a carburized hardened layer in which crystalline chromium carbide is not formed, or a hard coating disposed over the carburized hardened layer, where the hard coating has a surface hardness greater than that of the carburized layer, as is presently claimed.

Maquelin discloses a method of manufacturing a watch case element, where the element is formed of molybdenum and is hardened by carburizing to produce a surface layer of

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molybdenum carbide. Thus, the elements disclosed by Maquelin are completely different in their structure from the presently claimed decorative item. For example, Maquelin does not disclose or suggest a carburized hardened layer in which crystalline chromium carbide is not formed, or a hard coating disposed over the carburized hardened layer, where the hard coating has a surface hardness greater than that of the carburized layer, as is presently claimed.

Suwa JP'671 discloses hard external parts for a timepiece prepared by forming a hardened layer of nitride or carbonitride of Ti, Zr, or Hf on the surface of an alloy consisting essentially of TiC and containing specific amounts of Ni, Cr, Mo, and Fe. Thus, the parts disclosed by Suwa JP'671 are completely different in their structure from the presently claimed decorative item. For example, Suwa JP'671 does not disclose or suggest a carburized hardened layer in which crystalline chromium carbide is not formed, or a hard coating disposed over the carburized hardened layer, where the hard coating has a surface hardness greater than that of the carburized layer, as is presently claimed.

Suwa JP'642 discloses a process for surface treatment of an external part for a wristwatch made of titanium or a titanium alloy. The surface treatment includes applying a titanium carbide layer by carbonizing the surface with carbon gas plasma. Thus, the parts disclosed by Suwa JP'642 are completely different in their structure from the presently claimed decorative item. For example, Suwa JP'642 does not disclose or suggest a carburized hardened layer in which crystalline chromium carbide is not formed, or a hard coating disposed over the carburized hardened layer, where the hard coating has a surface hardness greater than that of the carburized layer, as is presently claimed.

Glory discloses a watchcase and a watchstrap having a hard layer, wherein the surface of stainless steel is coated with titanium nitride, titanium carbide, or titanium carbinitride and a process for producing a watchcase and a watchstrap that includes carburizing, nitriding, or

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carbonitriding a stainless steel with titanium nitride, titanium carbide, or titanium carbonitride. However, the watchcase and watchstrap disclosed by Glory are completely different in their structure from the presently claimed decorative item. For example, Glory does not disclose or suggest a carburized hardened layer in which crystalline chromium carbide is not formed, or a hard coating disposed over the carburized hardened layer, where the hard coating has a surface hardness greater than that of the carburized layer, as is presently claimed.

As none of Preisser, Maquelin, Suwa JP'642, Suwa JP'671, or Glory discloses all of the limitations or elements of the presently amended claims, none of them anticipate the claims. Accordingly, the rejection of claims 1-12, 19-28 and 38-44 under 35 U.S.C. § 102(b) should be withdrawn.

Claims 13 and 14 stand rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 4,699,850 to Kishi (hereinafter "Kishi") or U.S. Patent No. 4,791,017 to Hofmann et al. (hereinafter "Hofmann").

Kishi discloses an ornamental part utilized in watchcases, watchbands, spectacle frames, accessories and such, where the material of the member is a heat-resisting material such as metal, ceramics, or plastic. The material is covered by a three-layer structure coating: a layer which has gold colored titanium nitride as its main component, a layer which has gold colored zirconium nitride as its main component, and a gold or gold alloy layer formed on the outer layer.

Hofmann discloses a decorative article having a layer of at least one a carbonitride of titanium, zirconium, hafnium, or vanadium or hafnium nitride, and an optional surface layer at least containing gold. The underlayer and surface layer may be deposited in a cathode vaporization process from corresponding metallic cathode targets in appropriate neutral or reactive atmospheres.

However, the parts disclosed by Kishi and the decorative article disclosed by Hofmann are completely different in their structure from the presently claimed decorative item. For example, neither of Kishi or Hofmann discloses or suggests a carburized hardened layer in which crystalline chromium carbide is not formed or a hard coating disposed over the carburized hardened layer, where the hard coating has a surface hardness greater than that of the carburized layer, as is presently claimed.

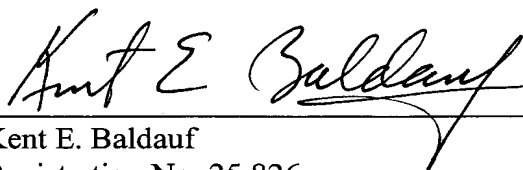
As none of Kishi or Hofmann disclose all of the limitations or elements of the presently amended claims, none of them anticipate the claims. Accordingly, the rejection of claims 13 and 14 under 35 U.S.C. § 102(b) should be withdrawn.

In order to anticipate a claim, a prior art reference must disclose every limitation in a claim. As none of the cited references disclose every limitation in the amended claims, all of the rejections under 35 U.S.C. § 102(b) should be withdrawn.

In view of the above amendments and remarks, reconsideration of the rejections and allowance of claims 1-78 are respectfully requested. If the Examiner should have any questions regarding this Amendment, he is encouraged to contact the undersigned attorney.

Respectfully submitted,

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Marked-up Version of Claims

1. (Amended) A decorative item comprising:

a basis material of a stainless steel,

[having] a carburized hardened layer extending from a surface [thereof] of the basis material to an arbitrary depth wherein [a solute atom] carbon is diffused so as to form a solid solution in which crystalline chromium carbide is not formed; and

at least one hard coating disposed on a surface of the carburized hardened layer of the basis material,

wherein the hard coating has a surface hardness greater than that of the carburized layer.

8. (Amended) The decorative item as claimed in claim 7, further comprising an intermediate layer disposed between the hard coating of carbon and a surface of the carburized hardened layer of the basis material.

9. (Amended) The decorative item as claimed in claim 8, wherein the intermediate layer comprises a lower layer of Ti or Cr disposed on the carburized hardened layer surface of the basis material and an upper layer of Si or Ge disposed on a surface of the lower layer.

10. (Twice Amended) The decorative item as claimed in claim 1, wherein at least two hard coatings are formed on the carburized hardened layer surface of the basis material.

11. (Twice Amended) The decorative item as claimed in claim 1, wherein at least two hard coatings are laminated on the carburized hardened layer surface of the basis material.

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12. (Twice Amended) The decorative item as claimed in claim 1, wherein the hard coating is disposed on portion of the carburized hardened layer surface of the basis material.

16. (Amended) A process for producing a decorative item, comprising the steps of:

providing a basis material of stainless steel,

[having] carburizing a surface of the basis material to form a carburized hardened layer extending from the surface [thereof] of the basis material to an arbitrary depth wherein [a solute atom] carbon is diffused so as to form a solid solution in which crystalline chromium carbide is not formed; and

forming at least one hard coating on a surface of the carburized hardened layer of the basis material,

wherein the hard coating has a surface hardness greater than that of the carburized layer.

19. (Amended) An exterior part of timepiece, comprising a stainless steel having at its surface a carburized layer wherein carbon is diffused so as to form a solid solution in which crystalline chromium carbide is not formed,

wherein the carburized layer has a [polished] specular surface [whose] obtained by removing rough faces formed on the outermost surface thereof and polishing, and having a Vickers hardness (HV) [is] of 500 or more.

21. (Amended) An exterior part of timepiece, comprising a stainless steel having at its surface a carburized layer wherein carbon is diffused so as to form a solid solution in which

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crystalline chromium carbide is not formed,

wherein the carburized layer has a machined surface.

24. (Amended) A wristwatch band comprising a plurality of band pieces of stainless steel connected to each other,

each of the band pieces having at its surface a carburized layer wherein carbon is diffused so as to form a solid solution in which crystalline chromium carbide is not formed,

wherein the carburized layer has a [polished] specular surface [whose] obtained by removing rough faces formed on the outermost surface thereof and polishing, and having a Vickers hardness (HV) [is] of 500 or more.

25. (Amended) A wristwatch band comprising a plurality of band pieces of stainless steel connected to each other,

each of the band pieces having at its surface a carburized layer wherein carbon is diffused so as to form a solid solution in which crystalline chromium carbide is not formed,

wherein the carburized layer has a machined surface.

26. (Twice Amended) The wristwatch band as claimed in claim 24, wherein the band pieces are connected to each other by means of connecting parts of stainless steel,

each of the connecting parts having [at] on at least a portion of its surface a carburized layer wherein carbon is diffused so as to form a solid solution.

(Ref. 2)

JP-A 51-59732

PATENT APPLICATION

Serial No. 09/831,327

Attorney Docket No. 1217-010737

【Title of the Invention】

EXTERNAL PART FOR TIMEPIECE

What is claimed is :

An external part for timepiece having double carbide layers, comprising a carbide layer formed on the external part by carburizing treatment (carbonization) and a metallic carbide layer of excellent corrosion resistance formed on the carbide layer.

【Detailed Description of the Invention】

The present invention relates to an external part for timepiece having double carbide layers, comprising a carbide layer formed on the external part by carburizing treatment (carbonization) and a metallic carbide layer of excellent corrosion resistance formed on the carbide layer.

Specifically, the double carbide layers comprise a carburized layer which is formed thick for the purpose of strength by the previously-conducted carburizing treatment and a carbide layer formed afterward for the purpose of corrosive resistance and decorative effects.

According to the present invention, a hitherto-unobtainable external part for timepiece that is hard, colored and excellent in corrosive resistance can be obtained by combining the above two carbide layers.

(Ref. 3)

JP-A 51-59733

PATENT APPLICATION

Serial No. 09/831,327

Attorney Docket No. 1217-010737

【Title of the Invention】

EXTERNAL PART FOR TIMEPIECE

What is claimed is :

An external part for timepiece having double nitride layers, comprising a nitride layer formed on the external part by nitriding treatment and a metallic nitride layer of excellent corrosion resistance formed on the nitride layer.

(Ref. 4)

JP-A 57-72605

PATENT APPLICATION

Serial No. 09/831,327

Attorney Docket No. 1217-010737

【Title of the Invention】

PROCES FOR PRODUCING HARD WATCHSTRAP

What is claimed is :

A process for producing a hard watchstrap, comprising:
constructing a watchstrap with titanium or a titanium alloy;
subjecting the watchstrap to gas nitriding or carburizing to form a first hard layer on the watchstrap surface and simultaneously forming a hard layer between the first hard layer and the substrate by means of diffusion; and
forming a second hard layer by physical deposition process such as ion plating on the first hard layer.

Ref. J.

PATENT ABSTRACTS OF JAPAN

PATENT APPLICATION

Serial No. 09/831,327

Attorney Docket No. 1217-010737

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C22C 29/00
G04B 37/22

(21)Application number : 55-175192

(71)Applicant : SEIKO EPSON CORP

(22)Date of filing : 11.12.1980

(72)Inventor : HARADA MASANOBU

(54) HARD EXTERNAL PARTS FOR TIMEPIECE

(57)Abstract:

PURPOSE: To provide corrosion resistance and a golden color tone by forming a hardened layer of nitride or carbonitride of Ti, Zr, Hf on the surface of a super hard alloy consisting essentially of TiC and contg. specific amts. of Ni, Cr, Mo, Fe.

CONSTITUTION: External parts such as watch cases, bands, etc. of a superhard alloy consisting of 5W30 Ni, 4W15 Cr, 2W10 Mo, <5 Fe by weight % and the balance unavoidable impurities are manufactured. A hardened layer of nitride or carbonitride of Ti, Zr, Hf of 0.1W10 μ thicknesses is formed on the surfaces thereof. Above 10 μ , chipping occurs in sharp parts such as ridge lines, and below 0.1 μ , the uniformity of the film is lost.

LEGAL STATUS

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[Date of extinction of right]

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(Ref. 9)

JP-A 52-82642

PATENT APPLICATION

Serial No. 09/831,327

Attorney Docket No. 1217-010737

【Title of the Invention】

PROCESS FOR SURFACE TRETMENT OF EXTERNAL PARTS FOR WRISTWATCH

What is claimed is :

A process for surface treatment of external parts for wristwatch of titanium or a titanium alloy comprising forming a titanium carbide layer by carbonizing the surface with carbon gas plasma.

(Ref. 10)

JP-A 56-8004

PATENT APPLICATION

Serial No. 09/831,327

Attorney Docket No. 1217-010737

【Title of the Invention】

**WATCHCASE HAVING A HARD LAYER AND PROCESS FOR PRODUCING
THEREOF**

What is claimed is :

【Claim 1】

A watchcase and watchstrap having a hard layer, wherein the surface of stainless steel is coated with titanium nitride, titanium carbide or titanium carbonitride with a thickness of $0.5\ \mu$ or $5\ \mu$.

【Claim 2】

A process for producing a watchcase and watchstrap comprising carburizing, nitriding or carbonitriding stainless steel and coating the stainless steel with titanium nitride, titanium carbide or titanium carbonitride.

PATENT ABSTRACTS OF JAPAN

PATENT APPLICATION

Serial No. 09/831,327

Attorney Docket No. 1217-010737

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(21)Application number : 57-083767

(71)Applicant : SEIKO INSTR & ELECTRONICS LTD

(22)Date of filing : 18.05.1982

(72)Inventor : OKAMOTO RYUZO
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(54) EXTERNAL PARTS FOR WRISTWATCH

(57)Abstract:

PURPOSE: To obtain external parts for wristwatches having uniform quality and the good yield of production, by nitriding the surface of stainless steel with gaseous N₂ plasma then forming TiN by a reactive ion plating method.

CONSTITUTION: External parts for wristwatches are put into a vacuum vessel and after the inside thereof is evacuated to 10⁻² Torr, gaseous N₂ is introduced to about 10⁻¹ Torr pressure, and a high voltage is applied between two electrodes to convert the gaseous N₂ to plasma and nitride the surface of the external parts. The plasma treatment time is 5minW1hr. The above-described nitride film is then coated with TiN in a reaction vessel in which Ti is evaporated and N₂ is introduced as ordinary ion plating. The drawback in the prior art, that is, the failure in sticking of the TiN film on the stainless steel owing to the defective adhesion in the stage of forming said film is eliminated by the above-mentioned treatment. The external parts for wristwatches having uniform quality and the good yield of production are thus obtained.

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